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A REVISION OF THE NEARCTIC HEMEROBIIDÆ.

BY NATHAN BANKS.

(Plates III–V.)

The Hemerobiidæ are similar in general structure to the Chrysopidæ; however, they differ strikingly in several respects. They are brownish in color, while the Chrysopidæ are green; they are much less common than the latter family in specimens, yet the species are as numerous; there is much greater dissimilarity among them in structure and habits than among the Chrysopidæ. None have been observed to emit the disagreeable odor common to many Chrysopas.

They differ structurally from the Chrysopidæ in having a much shorter pronotum, being broader than long, in having fewer cross-veins in the wing, almost all represented in the two gradate series, so that the cells are often four to six times as long as broad, while in the Chrysopidæ the cells are rarely more than twice as long as broad. The latter family has always but one radial sector, which is connected back to the radius by at least six cross-veins, while in the Hemerobiidæ there are usually several radial sectors and when but one it is connected back to the radius by not more than four cross-veins. The difference upon which the family was based is that the antennæ are moniliform, that is, the joints are of nearly equal size throughout; while in the Chrysopidæ the antennæ are setaceous, that is, the joints taper toward the tip. Except one species, they are of smaller size than the allied family.

At rest the wings are held roof-like over the body. Their flight is slow, and often irregular I have never observed any flying in bright sunshine (unless disturbed), however, at twilight or in cloudy weather they become active, and at night are attracted to lights. The adults have not been observed to take any nourishment, and probably do not live more than a week or two, except during winter. Several of the common species of *Hemerobius* evidently hibernate in the adult condition, as the flies are taken in late fall and early spring; others probably winter in the pupal condition.

At least five of our Hemerobiids occur also in Europe; four of these are sub-boreal species. Several others are closely allied to European species. Most of our genera occur in Europe; so it is probable that our Hemerobiid fauna has a common origin with the European. As a whole they are more numerous in the north, both in species and in specimens. A number of species favor pine trees.

There are no secondary sexual differences, save in the genera *Dilar* and *Psectra.* The male genitalia are usually more highly developed than in the Chrysopidæ, and in several of our large genera these characters are of the utmost importance in the separation of species.

The larvæ are all (as far as known) predaceous, and have their mouth-parts modified, as in the Chrysopidæ, for the purpose of sucking up the juices of their prey. The larval head, however, is not as large, and the body tapers forwards so that they are spindle-shaped. The larvæ of two genera (*Climacia* and *Sisyra*) are aquatic. That of *Sisyra* was discovered by Hogg in 1839 in fresh-water sponges. Three years afterward Westwood described it as *Branchiostoma spongillæ.* It possesses jointed respiratory filaments attached to the under side of the abdominal segments. Mr. Needham has published an account of the habits and transformations of these forms in Bull. No. 40, New York State Museum. The cocoons are made above water, and consist of a dense inner case, surrounded by a much larger loose network. The flies emerge in summer.

I have reared *Micromus posticus* from the larva, which is not uncommon on trees, feeding on plant lice. It is naked, fusiform in shape, pale brown in color, and has a large white spot on each side of the mesothorax and metathorax. It spins a nearly spherical cocoon of white silk, and transforms to the adult in ten days.

The larvæ of *Hemerobius* appear to be much less known than allied forms; I have not bred any, but a larva given me by Mr. Schwarz probably belongs to this genus; it has a broader head, a shorter body than *Chrysopa;* and the lateral processes of thorax are very long; this specimen was taken among fallen leaves and carried the empty shells of several small mollusks.

The European forms of this family have never been reviewed; McLachlan about 1870 published on the British species, and a few years since treated of certain species of *Hemerobius.* A general revision of the European species would be of great value to the American student.

The Hemerobiidæ were formerly united to the Chrysopidæ in one family. The restricted family has commonly been divided into three groups. One of these is based on the peculiar genus *Dilar*. Another (Osmylinæ) has often been separated by having but one radial sector, while the true Hemerobiinæ have two or more sectors. This, I consider, a poor character, since the number of radial sectors varies in the species and in the opposite wing of the same specimen. Therefore I have separated the two groups on the point of termination of the subcosta ; whether it ends in the margin of the wing (Hemerobiinæ) or whether it runs into the radius (Sisyrinæ). This makes a slightly different alignment, and I think more natural. We do not have the genus *Osmylus* in this country, and I expect that it, together with various allied exotic genera, will form another subfamily. Our eleven genera are based almost wholly on venational characters; while specific characters are also found in the venation, the shape of wings, the male genitalia, and to a less extent in coloration. The pattern of coloration is usually constant for each species, but the extent of its development varies greatly; too much stress has been laid upon the markings by many authors. Striking differences in markings, unaccompanied by structural differences, should be looked upon with much suspicion.

This paper is based principally on my own collection, but I have had free use of the material in the National collection, and, through the kindness of Mr. Henshaw, have examined the material in the Museum of Comparative Zoology at Cambridge containing nearly all of the Fitch types.

The three subfamilies known to occur in our country may be tabulated as below :

SYNOPSIS OF SUBFAMILIES.

1. Male with pectinate antennæ; female with an exserted ovipositor...DILARINÆ.
   Antennæ not pectinate in either sex ; female without exserted ovipositor...2,
2. Subcosta runs into radius near pterostigma; usually but one radial sector, at least none arising beyond basal third of wing............SISYRINÆ.
   Subcosta runs into margin of wing; normally at least two radial sectors, the last beyond basal third of wing....................HEMEROBIINÆ.

DILARINÆ.

Contains but the one genus—*Dilar*.

DILAR Rambr.

Antennæ of male pectinate; female with an ovipositor, commonly as long as body; vertex of head with three tubercles resembling ocelli. Wings entire ; four or more radial sectors ; subcosta ends in margin ; no recurrent vein ; gradate veins irregular.

Type.—*D. nevadensis* Rbr.

I have never taken our one species, which does not appear to have been collected since its description.

Dilar americanus McLachlan.—"Body whitish, with a faint yellowish tinge, clothed with whitish hairs, with which a few black hairs are intermingled. Face yellowish. Eyes metallic-silvery. On the head above are three very large, somewhat closed placed, rounded-oval tubercles. Antennæ concolorous with the body, apparently 17-jointed, the joints short, somewhat moniliform, not toothed internally at the apex, the terminal joint ovate. Legs whitish, with white hairs; the tips of the femora, tibiæ and tarsi testaceous; claws minute, simple, piceous. Apex of the abdomen forming an elongate pyriform opening, in the middle of which are two large rounded, whitish, finely granulose tubercles (extraneous bodies ?); ovipositor longer than the entire body in the dry insect, yellowish white, semi-transparent, slender, slightly curved. Wings pale whitish hyaline, each with about twenty rather large greyish spots, some of which, in the apical half of the wing, show a tendency to unite into fasciæ; neuration pale, darker in the spots, hairs long, whitish, but mixed with blackish, especially on the spots; subcostal area almost without transverse nervules; costal veinlets simple, with faint indications of marginal rudiments between them ; principal sector with five branches in both pairs; transverse nervules very few, so that the neuration is remarkably open ; a discal horny point between the first and second branches of the sector; nearly all the apical and marginal nervures, bifurcate or trifurcate, with minute marginal rudiments;

Female.—Length of body (without ovipositor) about 3 mm ; length of ovipositor about 3¾ mm. Expanse of wings about 14 mm."

Described from "one female example (not in very good condition) taken by Mr. Sanborn at Bee Spring, Kentucky, in June, 1874."

McLachlan says that with the South American species this may form a separate genus on account of more open venation, and one (many branched) sector to the radius ; in the European species there is a simple sector arising before the branched one.

I have seen the type in the Museum of Comparative Zoology at Cambridge. The radial sector has five forks, and is connected back to radius three or four times: the median vein is simple until near the tip of wing where it is forked ; the upper cubitus forks at middle and is connected to median twice; the lower branch of cubitus and the anal vein have several branches running into the posterior margin.

SISYRINÆ.

SYNOPSIS OF GENERA.

1. Ten or more branches to radial sector; and a submarginal series of cross-veinlets; a recurrent vein at base; large species.....**Polystœchotes.**
   About five or fewer branches to radial sector; no submarginal series of cross-veinlets; no recurrent vein; smaller species.......................2.
2. Apical margin of wing plainly excised; about five branches to radial sector. **Lomamyia.**
   Apical margin entire; about two branches of radial sector.................3.
3. Radial sector with but one branch; in hindwing the subcosta runs into radius much before the pterostigma..........................**Climacia.**
   Radial sector with two branches; in hindwing the subcosta runs into radius at the pterostigma....................................**Sisyra.**

SISYRA Burm.

Wing entire; the subcosta runs into the radius near pterostigma in both wings; but one radial sector; costal area narrow at base; the costal veinlets simple; no recurrent vein; no gradate series, the few cross-veins very irregular in position; median vein forked several times. Last joint of palpi (especially labial) much swollen.

Type.—*S. fuscata* Fabr.

Sisyra vicaria Walker.—Head shining, pale yellow; vertex hairy; antennæ pale brownish; second joint dark brown; legs pale yellow; thorax yellow-brown; abdomen brown. Wings brown; venation dark brown; more or less indication of a darker streak between the veins; hindwings scarcely darkened, costal area dark; venation brown. Wings in male shorter than in female, rather hairy, broadly rounded at tips; narrow at costal margin at base; costal veinlets simple; one radial sector, with four branches; no gradate veinlets, a few cross-veinlets in basal part of wing; fringe short; hindwings with one radial sector, with three branches. Expanse 11-13 mm.

Specimens from near High Island, Maryland (near Washington, D. C.), June 17th and 25th, and July 14th; Mosholu, New York, September 1st; Lake Forrest, Illinois, June; Ithaca and Saranac, New York, June; also Detroit, Michigan, and Kaslo B. C. (Currie). The types were from Georgia.

Mr. Needham's *S. umbratus* (of which I have several co-types, kindly sent me by him) does not appear to differ in any important point; it is rather larger and darker. The Mosholu specimen is very dark and as small as any Washington specimen. I do not have males of *S. umbratus*, but figure the genitalia of *S. vicaria*; perhaps there may be differences in this respect.

CLIMACIA McLach.

Antennæ moniliform; subcosta of both wings runs into radius near pterostigma; but one radial sector; costal area of forewings very narrow at base, the veinlets simple, and no recurrent vein; two short, broken, gradate series in the forewings, only one in hindwings; the median vein is forked but once; margin of wing even; last joint of palpi not much swollen.

Type.—*C. areolaris* Hagen.

Climacia areolaris Hagen.—Head uniform, shining yellowish brown; antennæ dark brown; thorax yellowish brown, pleura black; abdomen dark brown; legs pale yellow. Wings yellowish hyaline; two large dark brown patches, one near base between subcosta and radial sector, and an oblique mark from the inner end of the pterostigma to near the middle of wing, between the ends of these marks and obliquely backward across the wing the veins are dark brown, and have dark lines between them; the radial sector and median continue dark, but the other veins are suddenly pale for a short distance and then all are dark again, in this part of the wing there are dark marks between the veins; there is a dark spot on middle of hind margin (often indistinct), and a small one at tip of the pterostigma; hindwings with a dark spot before and a smaller one after pterostigma; venation partly brown.

The head is rather full and round; the antennæ are heavier than usual; the wings are slender. The costal area is narrow at base, the costal veinlets not forked, and the two short gradate series run slightly outward; the radial sector is connected back to radius three times. In the hindwings there is one radial sector, giving off two branches; pterostigmatic region of both wings heavily veined. Expanse 9–10 mm.

Specimens from Shreveport, Louisiana; Plummer's Island, Maryland, August 24th (Busck); Franconia, New Hampshire (Slosson); and Orono, Maine (Harvey). It has also been recorded from Florida, Texas, Massachusetts and Saranac Mountains, New York. Needham bases his species (*C. dictyona*) on larger size (which is variable), on darker color (which also varies), and on the seven branches of cubitus. He says that the specimens in the Museum of Comparative Zoology have six branches; nearly all the specimens I have seen have but five branches; it is evident therefore that this character varies.

LOMAMYIA n. gen.

Antennæ moniliform; subcosta runs into the radius at pterostigma; no recurrent vein; one radial sector, which is connected back to radius twice, and gives off five branches; only one gradate series, which starts under the pterostigma and runs obliquely basad;

costal veinlets branched; outer margin of forewing concave, hindwing barely so; in hindwings one cross-veinlet below the pterostigma, and three near posterior margin; the radial sector with four branches.

Type.—*L. flavicornis* Walk.

Differs from *Isoscelipteron* Costa in having the subcosta end in the radius, and the fewer branches of radial sectors, as well as minor points. I have not seen the type of *Berotha* Walk., which is from India, but judging from the description it is a different genus from ours. I know but two species.

1. Apical margin sinuately concave, and with the hind margin sinuate before outer angle .... **flavicornis.**
Apical margin evenly concave .... **texana.**

Lomamyia flavicornis Walker.—Face brown, vertex pale, with dark dots; antennæ pale yellow, the basal joints with a few brown spots; prothorax yellowish, dotted and spotted with brown, rest of thorax dark brown; abdomen brown; legs yellowish, with brown spots and dots. Wings hyaline, venation pale, with brown dots, transverse veins entirely brown; some larger spots at forks of veins in apical part of wing, margin mostly brown, but with some patches of white, two in the concave part; pterostigma brown; hindwings with apical venation and pterostigma brown. Forewings falcate at tips, apical margin sinuately concave, and the posterior margin slightly concave before outer angle; five branches to radial sector. Expanse 22–24 mm.

Specimens from Falls Church, Virginia, July 4th; Prospertown and Lakehurst, New Jersey, May 25th. Walker's specimens came from Georgia, and Hagen records it from Washington, D. C.

Lomamyia texana Banks.—Face yellowish, vertex spotted with brown; antennæ pale yellow; prothorax short, brownish, rather densely clothed with brown bristles; abdomen brown; legs pale, with scattered dark dots, and clothed with gray hair and black bristles. Wings tinted with brown; venation brown, dotted with white; there are many scattered round brown spots, each centered upon a vein; along the costa are are several large dark brown spots, and the pterostigma is dark brown; the apical margin is brown, interrupted with white; gradate veinlets and the basal cross-veinlets heavily dark brown; hindwings hyaline, pterostigma brownish, the cross-vein below it margined with brown. The outer margin of forewings is evenly and deeply concave, not at all sinuate; there are five branches of the radial sector; in hindwings with four branches; margins of both pairs are fringed. Length 9–12 mm.

Specimens from Texas; Phoenix, Arizona, and Ormsby County, Nevada, July.

POLYSTŒCHOTES Burm.

Wings entire; subcosta runs into radius near pterostigma in both wings; in both pairs a recurrent vein at base; the costal veinlets forked near tip; one radial sector, with from ten to twenty branches, which are nearly always simple until the outer gradate series; two very oblique gradate series in both wings; median vein forked several times.

Type.—*P. punctatus* Fabr.

Polystœchotes punctatus Fabricius.—Face yellowish; dark brown between eyes and on the vertex; antennæ brownish, the second joint and sometimes the first dark brown; palpi marked with brown; thorax and abdomen brown; pronotum with four pale streaks; legs yellowish, femora streaked on the outer side, and tips of tibiæ brown; tarsi mostly brown, except basal joint is often yellowish. Wings hyaline, venation interruptedly brown and yellowish; the gradate series mostly brown, and often partly margined with brown; a large brown patch on inner gradate series at first branch of radial sector and median vein; the median also heavily marked at end of outer gradate series; margin of wing with alternate patches of brown and whitish, a few brown spots between radial sector and radius; one long one near tip of wing; sometimes a large patch on anal veins at margin, and the anal veins often crossed by several wavy brown bands; hindwings with the costal margin and the posterior fringe alternately white and brown; venation mostly brown, the costal veins interrupted with pale.

Wings rather acute at tip, broad in middle, entire; costal area rather narrow at base, but with a long recurrent nervure; one radial sector with twelve to eighteen branches, mostly simple to the outer gradate series, where they are forked several times; two very oblique gradate series, the outer one is parallel to the apical and hind margin. Body and legs very hairy. Expanse 40–75 mm.

All over the northern half of our country and extending southward in the mountains, as into North Carolina, New Mexico and Arizona; more common in the northwest than elsewhere. Very variable in size and somewhat in markings. It is strange that the larva of this, our largest Hemerobiid, is unknown; perhaps it is parasitic in some aquatic insect.

HEMEROBIINÆ.

SYNOPSIS OF GENERA.

1. A recurrent vein at base of forewings .... 2.
   No recurrent vein at base of forewings .... 5.
2. More than four radial sectors............................ **Megalomus.**
   Four, or fewer, radial sectors .... 3.
3. No outer cross-veinlets in hindwings, only four, or less, in outer gradate series of forewings; usually but two radial sectors; a cross-veinlet connecting first radial sector to median; the median is usually a little bent

toward the cubitus at connecting veinlet; in hindwings the median usually forks plainly beyond forking of radial sector; small species. **Sympherobius.**

Outer cross-veinlets present in hindwings; more than four veinlets in outer gradate series in forewings; usually three or four radial sectors....4.

4. A cross-veinlet connecting first radial sector to median some distance out on the former; often four radical sectors; the median is rarely bent toward the cubitus at connecting veinlet; in hindwings the first radial sector forks as far out as forking of median; larger species. **Boriomyia.**

The cross-vein from median to radius is before or at origin of radial sector, never out upon it; three, rarely four, radial sectors; the median is more or less bent toward cubitus at connecting veinlet; in hindwings the median is forked farther out than fork of first radial sector. **Hemerobius.**

5. But one radial sector, and but one series of gradate veinlets ......**Psectra.**

Several radial sectors, and two series of gradate veinlets ......**Micromus.**

HEMEROBIUS Linn.

Antennæ moniliform; wings entire; subcosta ending in margin; costal area quite broad at base; with a recurrent nervure; costal cross-veins branched; two series of gradate veinlets in both pairs of wings, the outer in forewings of more than four veinlets; no cross-vein connecting first radial sector to median; three or four radial sectors; the median is bent more or less toward the cubitus at connecting veinlet; in hindwings the median is forked farther out than fork of first radial sector.

Type.—*H. humuli* Linn.

The type of *Mucropalpus* Rambur is *M. lutescens* Rambur (nec. Fabricius), and is the same as *H. humuli.*

The *Hemerobius* of Linné covered everything in this family and the Chrysopidæ, as well as other forms; gradually it has been restricted, and I have now divided in into three genera, retaining the name for the best known section. The custom of years has fixed the name, although several earlier authors used it for *Chrysopa.* In correspondence with Prof. Klapalek, who has kindly furnished me with many European species, I find that this division of the genus will apply to the European species as follows: *Hemerobius* (s. str.): *humuli, micans, atrifrons, nitidulus, stigma, limbatellus, lutescens, orotypus; Boriomyia: concinnus, 4-fasciatus, subnebulosus, nervosus; Sympherobius: elegans, parvulus, inconspicuus.*

SYNOPSIS OF SPECIES.

1. Basal cross-vein connecting median to radius ends upon radius near to connecting veinlet between radius and subcosta, and is shorter than distance out to first radial sector........2.
   Basal cross-vein ends near first radial sector, at least not more than its length therefrom........6.
2. Last veinlet of inner gradate series below or basad of the previous one (rarely a little beyond it); pterostigma, especially of hindwings, usually distinctly rufous; forewings more narrow........3.
   Last veinlet of inner gradate series distinctly beyond previous one; pterostigma barely, if at all, rufous; forewings broader........5.
3. Eastern specimens........**stigmaterus.**
   Western specimens........4.
4. The second radial sector arises much nearer to the third than to the first. **kokaneeanus.**
   Radial sectors at subequal distances at origin........**mœstus.**
5. Eastern specimens........**humuli.**
   Western specimens........**pacificus.**
6. Practically no markings, except dots along the veins........7.
   With larger spots and bands........8.
7. Smaller, pale species, three radial sectors........**hyalinatus.**
   Larger, darker species, usually four radial sectors........**dorsatus.**
8. The second fork of cubitus beyond basal connecting veinlet is almost as near to the first fork as to the third; the last veinlet of inner gradate series is beyond the previous one........**cockerelli.**
   The second fork of cubitus beyond basal connecting veinlet is much nearer to the third than to the first; last veinlet of inner gradate series usually below or basad of previous one........9.
9. Face blackish; apical margin of wing not marked with patches of white and dark........**conjunctus.**
   Face pale, apical margin of wing marked with large patches of white and dark........**nevadensis.**

Three species are not included in the above table.

H. simplex differs from *H. stigmaterus* and *H. mœstus* by smaller size and different genitalia.

H. marginatus differs from *H. humili* in having a broader costal area.

H. simulans differs from *H. humuli* in more slender wings and in being more heavily marked.

Hemerobius stigmaterus Fitch.—Head pale yellow, a reddish brown stripe each side from near eye to mouth; antennæ pale yellow; palpi marked with red-brown; thorax with a broad median yellow stripe, and a red-brown stripe each side; abdomen brown, often yellow at tip; legs pale yellowish. Wings hyaline, venation yellow, dotted with brown, from which arise angular brownish fascia upon the membrane of wing; the gradate veins brown, and the veinlet connecting median and cubitus heavily brown; pterostigma brown, distinct; around the margin are scattered brown dots. In the hind wings the venation near tip is brown, and the pterostigma is very prominent, being reddish brown. The median is plainly bent toward the cubitus at the connecting veinlet; the gradate series are full and even; the costal space at base is moderately broad. In hindwings the first fork of radial sector is plainly before the fork of median. Expanse 16–18 mm.

Many specimens from Ithaca and Sea Cliff, New York; Washington, D. C.; Agricultural College, Michigan; St. Anthony's Park, Minnesota; Central Missouri; Iowa; and Douglas County, Kansas. In April and May, and again from August till October. It is closely allied to the European *H. pini.* I have seen the type in the Museum of Comparative Zoology at Cambridge, Mass.

Hemerobius kokaneeanus Currie.—Head dark, blackish on clypeus; thorax black on sides, paler in middle; abdomen dark; legs pale, with faint indication of dark bands at tips of femora and tibiæ. Wings hyaline, considerably marked with brown, especially along apical and posterior margin; the gradate series margined, and a large spot on basal cross-veins; white spots along the margin, pterostigma faintly reddish, venation with dark and pale spaces, but cross-veinlets are wholly brown; hindwings smoky, venation mostly dark. Wings slender; costal area narrow toward base, median plainly bent toward cubitus at connecting veinlet; three radial sectors, the second arising much closer to the third than to the first; last veinlet of inner gradate series basad of the previous one; in hindwings the radlal sector forks before forking of median. Expanse 14 mm.

One specimen, female, in bad condition, taken on Kokanee Mt., British Columbia, at an altitude of 9000 feet, on August 10th, by Mr. Curriè. The specimen is in the National Museum. In shape and venation it is like *H. mœstus,* except for the peculiar position of the second radial sector (not noticed by Mr. Curriè). *H. mœstus* varies much in markings, but always differs in pale hindwings.

Hemerobius mœstus Banks.—Head pale, a brown stripe below each eye, antennæ and legs pale, thorax pale, hardly brown on the sides. Abdomen rather obscure brown. Wings hyaline, venation pale; with scattered light brown dots, alternate brown and pale dots around margin; gradate veins brown and margined with brown; pterostigma reddish in both pairs of wings; hindwings not marked, venation pale. Wings rather narrow, costal area narrow toward base; median much bent toward cubitus at connecting veinlet; no veinlet connecting median and first radial sector; three sectors, the upper branch of third forked just before inner gradate series, lower branch simple; last gradate veinlet of inner series below or basad of the previous one. Expanse 15–17 mm.

Numerous specimens from various western localities; Olympia and Pullman, Washington; Idaho; Clear Creek, Colorado (Oslar);

Ormsby County, Nevada (Baker); Mesilla, New Mexico; Williams and Bright Angel, Arizona (Barber); Humboldt County, Los Angeles County and Lake Tahoe, California, and Kaslo, British Columbia (Currië). Taken from May to July.

Hemerobius simplex n. sp.—Head yellowish, shining, black under eyes, antennæ pale yellow; thorax pale yellow in middle, brown on sides; legs pale yellowish; abdomen brown. Wings hyaline, veins slightly marked with brown dots, and brown dots around margin of wing, the gradate veinlets brown, pterostigma fairly distinct, rather reddish. Wings rather narrow, three radial sectors, neither first nor second connected back to radius, but third is at or beyond first fork, costal area at base rather narrow, last gradate of inner series basad of previous one, median vein bent toward cubitus so that connecting veinlet is short, one-half as long as from cubitus to anal; three branches from cubital cell below. In hindwings the fork of radial sector is much before fork of median. Length 13–14 mm.

Two specimens, one from Prescott, Arizona, the other from Senator, Arizona (both Oslar), in May and June. Separated from *stigmaterus* and *mœestus* by smaller size and different male genitalia.

Hemerobius humuli Linn.—Head pale yellow, a red-brown stripe from each eye to mouth; antennæ yellowish; thorax with a broad median yellow stripe and red-brown lateral stripes; abdomen brown, legs yellowish. Wings hyaline, venation pale, marked with brown, rather evenly; the gradate series are more heavily brown and have more brown on their sides; the margin has white and brown spots alternating, there is a heavy dark brown mark on the veinlet connecting median and cubitus, the pterostigma is not distinct, and scarcely more so in the hindwings; the apical venation, especially the cross-veins in hindwings, is brown. Three radial sectors, the third forked twice or three times before outer gradate series; costal space quite broad at base. The median is bent toward the cubitus at connecting veinlet; in hindwings the first fork of radial sector is plainly before the fork of median. Expanse 15–17 mm.

Specimens from Ithaca and Sea Cliff, New York; Washington, D. C., and vicinity; Sulphur Springs, Pennsylvania; Onaga, Kansas, and Detroit, Michigan. From May on during the summer. There is, apparently, no doubt that *H. castanœ* Fitch is the European *H. humuli;* and McLachlan has recorded *H. humuli* from New York.

Hemerobius marginatus Steph.—Head pale yellowish, a reddish brown mark on each cheek; antennæ pale yellow; pronotum with a brown stripe each side, rest of thorax pale yellowish; abdomen pale brown; legs pale yellowish. Wings hyaline, venation pale, longitudinal veins barely, if at all, marked with brown, gradate veinlets mostly brown, but not margined, basal veinlets also brown, and those near posterior margin at base also brown and faintly clouded; some brown patches along apical margin, not very distinct. Hindwings with pale venation, pterostigma scarcely distinct. Forewings rather broad, the costal area at base broad, fully four times as broad as length of cross-veinlet connecting subcosta and radius; otherwise similar to *H. humuli*. Expanse 18 mm.

Females from Mt. Washington, New Hampshire (Mrs. Slosson).

McLachlan has recorded a female from the same locality; I have not seen a European specimen, but since it is closely allied to *H. humuli*, and said to differ in broader costal area, I think the identification is correct.

Hemerobius pacificus Banks.—Head pale, a brown stripe below each eye, and a line at base of antennæ, the latter pale, thorax pale, hardly brown each side; legs and abdomen pale; wings hyaline, venation pale with scattered brown dots, some of those near the base darker brown; these dots give off indistinct oblique clouds, gradate veinlets mostly brown, clouded to form an indistinct band, border with groups of brown dots, pterostigma indistinct. Wings rather broad, pointed at tip, costal space narrow toward base, median much bent toward cubitus at connecting veinlets; three sectors, upper branch of the third forked before the inner gradate series, lower simple. Last gradate veinlet of inner series is distinctly beyond the previous one. Hindwings not marked, veins pale, except a few of the outer gradate ones. Expanse 18-21 mm.

Many specimens from various places in the west as follows: Olympia, Pullman, Seattle and Mt. Ranier, Washington; Santa Fé, New Mexico (Cockerell); Kaslo, British Columbia (Currie); Fieldbrook and Placer County, Los Angeles County and San Diego County, California; Williams and Bright Angel, Arizona.

Hemerobius simulans Walk.—Face yellowish, cheeks with brown stripe, a brown spot above each eye; pronotum and rest of thorax pale in middle, brown on sides; abdomen brown; legs pale yellowish; wings dusky hyaline, venation pale, rather heavily marked with brown, a larger spot on basal crossveins, a band on inner gradate series, and apical margin with alternate brown and white patches, outer gradate series less heavily marked, spots at forkings of veins; hindwings with mostly brown venation, pterostigma rather distinct. Forewings rather long and narrow, costal area at base rather narrow, not much over twice the length of veinlet connecting subcosta and radius; a cross-vein near base of first radial sector back to median; last gradate of inner series just beyond previous one. Expanse 17 mm.

One specimen from Ithaca, New York, which I think is this species recorded from Nova Scotia and Canada. I have not seen a male. It has rather more slender wings than the allied species, and is more heavily marked. McLachlan, who has seen the type in the British Museum, says it is the same as *H. orotypus*, a rather uncommon species in mountainous and northern Europe.

Hemerobius hyalinatus Fitch.—Head pale yellowish, black under the eyes, brown above each side, continued back upon the thorax; legs and abdomen pale yellowish. Wings hyaline, veins hyaline, evenly dotted with light brown; cross-veinlets not darker, margin with similar brown points; hindwings hyaline, with hyaline venation; pterostigma rather reddish in both pairs. Wings short, a little more than twice as long as broad, rounded at tip; median but little bent toward cubitus at connecting veinlet; a veinlet from median to radius near origin of first sector; three sectors, upper branch of third forked, lower simple; last veinlet of inner gradate series basad of next to last; in hindwings the radial sector is forked before forking of median. Expanse 12-14 mm.

Specimens from Sherbrooke, Canada (Bégin); Franconia, New Hampshire; Ithaca, New York. Fitch's specimens were from central New York; and Currie's specimen is from Kaslo, British Columbia, June 17th. It prefers pine trees. All taken in May and June. Since seeing a specimen in the Fitch collection in the National Museum labelled "*H. hyalinatus* var. *a*," there is no doubt that my. *H. canadensis* is the same. I have seen the type in the Hagen collection at Cambridge. It is readily known by its small size and pale color.

Hemerobius dorsatus Banks.—Head pale yellow, cheeks brownish, and a short brown line from middle of face down on the clypeus; antennal sockets marked with brown, antennæ pale, but darker at tips, thorax dark brown on sides, with a broad median stripe of yellow; abdomen brown; legs pale yellow. Wings hyaline, very evenly marked with brown fimbriæ, veins dotted with brown, the gradate series more heavily brown, outer and posterior margin alternately brown and white. In the hindwings the venation is brownish, and the pterostigma rather reddish. Forewings moderately long and narrow, costal area quite broad at base, the lower branch of median vein is slightly bent toward the cubitus, there are four radial sectors, the first three not forked till near tip, the fourth twice forked before gradate series, the basal cross-vein connecting median to radius ends near base of first radial sector. In the hindwings the first fork of radial sector is much before forking of median vein. Expanse 17 mm.

Specimens from Fort Collins, Colorado, August, and Veta Pass, Colorado, July.

Hemerobius cockerelli Banks.—Head pale yellowish, darker across base of clypeus; antennæ pale yellowish; thorax pale yellowish, with a broad brown stripe each side, not as plain behind as on prothorax; abdomen pale at base, dark beyond; legs pale. Wings pale brown, with many white spots throughout the middle region, on the margin similar spots on the veins, a darker brown band across both series of gradate veins, and a large spot at the connection between cubitus and median; margin of wing with a brown dot at end of each vein, and one between the ends, no white spots on margin; hindwings nearly hyaline, veins brownish, margin dotted as in forewings. Wings rather narrow; costal area moderately broad at base; median bent toward cubitus at connecting veinlet; a veinlet connecting median to radius near base of first radial sector; last veinlet of inner gradate series is beyond preceding one; in hindwings the radial sector forks before forking of median. Expanse 18 mm.

Type from top of Las Vegas Range, 11,000 feet, New Mexico (Cockerell), and the type of *H. caudelli*, which I consider identical, is from London Hill Mine, Bear Lake, British Columbia, 7,000 feet, July 29th.

Hemerobius conjunctus Fitch.—Head blackish, a pale spot on the labrum and one above antennæ; latter pale; thorax pale, a brown stripe each side; legs pale; the abdomen fuscous. Wings with pale venation, dotted with brown, these dots often surrounded by small clouds, those on the veinlets connecting median to anal form a large and prominent spot, and on the gradate veinlets, which are brown, they form a continuous band, border of wings rather obscure, and with alternating dark and pale dots, pterostigma hardly distinct; hindwings not marked, the costal and some of the gradate veinlets brown. Wings not very broad, tip almost pointed, costal area narrow toward base; median distinctly bent at connecting veinlet toward cubitus, a veinlet connecting median to radius close to base of the first sector; three sectors, upper branch of the third forked twice before outer series of gradate veinlets, lower branch simple, last gradate veinlet of inner series is below or basad of previous one. Expanse 16-18 mm.

Specimens from Mt. Washington and Franconia, New Hampshire (Slosson); Fitch's specimens from central New York, May; and Currie's *glacialis*, which is apparently the same (the specimen being very poor), is from Kokanee Mountain, British Columbia, 9,000 feet, August 10th. It is taken on or near pine trees. The type is in the Hagen collection.

Hemerobius nevadensis Banks.—Head pale yellowish, a brown dot between antennæ, the latter pale yellow, darker at tips. Thorax dark brown, with a broad median yellow stripe; abdomen dark brown, nearly black; legs pale yellow. Wings hyaline, the veins mostly pale, the radial sectors and some others dotted with brown. Around the margin are brown spots alternating with whitish ones; the gradate series are rather heavily marked with brown, and the veinlets connecting median, cubitus and anal near base are also brown. In the hindwings the venation is pale, except around the margin, where it is brown. The forewings are moderately long, the costal area rather narrow at base, the lower branch of the median is not bent toward the cubitus, so that the connecting veinlet is as long as that connecting cubitus to anal. Basal cross-vein connecting median to radius ends near origin of first radial sector. In the hindwings the first fork of radial sector is plainly before the forking of median vein. Expanse 15 mm.

One specimen, Ormsby County, Nevada, July (Baker).

BORIOMYIA n. gen.

Antennæ moniliform; wings entire; subcosta ending in margin; costal area broad at base; with a recurrent vein; costal cross-veins branched; two series of gradate veinlets in both pairs, the outer in forewings of more than four veinlets; a cross-vein connecting first radial sector to median vein; usually four radial sectors; the median is scarcely bent toward the cubitus at connecting veinlet; in hindwings the first radial sector forks as far out as forking of the median vein.

Type.—*B. disjunctus* Banks.

This genus includes several European species, notably *Hem. pellucidus.* The species are mostly found in the north or in mountainous localities.

SYNOPSIS OF SPECIES.

1. From cubitus between basal cross-vein and the last veinlet of inner gradate series there is but one fork; inner gradate series running into cubital cell .... 2.
   From cubitus between basal cross-vein and the last veinlet of inner gradate series there are several forks; inner gradate series not running into cubital cell .... 3.
2. Forewings banded at middle and tip, and hindwings at tip with brown. **fidelis.**
   Forewings not plainly banded; hindwings with dark spot at tip. **speciosus.**
3. First radial sector connected to second near base by a cross-veinlet .... 4.
   First radial sector not connected to second .... 5.
4. Apical margin of forewing alternately white and dark brown. **longifrons.**
   Apical margin of forewing evenly pale brown .... **transversus.**
5. Face pale yellow, with a median dark stripe below; wings rather evenly marked .... **coloradensis.**
   Face mostly brown or black, without dark median stripe below .... 6.
6. Forewings pale, with but few marks except two dark spots on inner gradate series; venation of hindwings almost entirely pale; face shining black .... **schwarzi.**
   Wings more heavily marked; apical of hindwings more or less brown .... 7.
7. Venation of hindwings almost wholly brown .... **disjunctus.**
   Venation of hindwings pale, except at tip .... **posticatus.**

Boriomyia fidelis Banks.—Head and thorax fuscous; antennæ and legs pale; abdomen blackish. Wings hyaline, venation pale, scarcely dotted with brown, gradate veinlets mostly fuscous; a dark band across wing from within pterostigma through gradate veinlets, and mostly fuscous beyond the second gradate series; hindwings with an indistinct dark band across the middle, and another just beyond outer gradate series, leaving a narrow pale, apical margin.

Wings broad, broadly rounded at tip; costal area very broad; radius and subcosta farther apart than usual and connected toward base by two veinlets; median not bent toward cubitus at connecting veinlet; a veinlet connecting median and first radial sector; four sectors, the fourth arising beyond the middle of the wing, forked once before outer gradate series, other sectors simple; last veinlet of inner gradate series basad of next to last; in hindwings the radial sector forks before the forking of median. Expanse 12-16 mm.

Specimens from Gowanda, New York (Van Duzee); Franconia, New Hampshire (Slosson); Lakehurst, New Jersey (Torre Bueno); Natrona, Pennsylvania; Falls Church, Virginia, and North Carolina. All taken during June or the last week of May.

Boriomyia speciosa Banks.—Head yellowish brown, darker above; antennæ pale yellowish; thorax almost black; abdomen dark brown; legs pale yellowish. Wings hyaline, marked with dark brown, venation mostly pale, with a few scattered brown dots, more brown toward margin of wing, apical half of both anterior and posterior margins interruptedly brown and yellowish, an indistinct brown patch in costal area before the pterostigma, five or six almost black dots along the radius, one at base of sectors, but first one beyond base of first sector, and one under the pterostigma; another similar spot on cubitus where it is connected to anal, a series of four or five obliquely across wing following the first gradate series, the anterior one being on the first fork of the fourth radial sector, and beyond is a crescent of five spots, most of them contiguous, on the upper part of the second gradate series the posterior four of these are geminate, with a minute white point, a larger triangular dark spot near end of cubitus and anal veins. Hindwings with the costal neuration near middle and toward apex distinctly brown, between it is very pale. The forewings are very broad, but acute at tips; the costal area is very broad at base. There are four radial sectors, but the first is rather peculiar, it arises nearer base than usual, at first diverges but little, but curves before origin of second sector; none of the sectors are connected back to radius; the median is not bent toward the cubitus at connecting veinlet. Expanse 15 mm.

One specimen from Plummer's Island, Maryland, September 9, 1903. A very distinct species on account of markings, and peculiar first radial sector.

Boriomyia longifrons Walk.—Face shining brown, vertex pale; antennæ pale yellowish, darker at tips; pronotum pale, with brown stripes each side, rest of thorax similar; abdomen pale brownish; legs pale yellowish, sometimes a darker band on anterior tibiæ. Wings hyaline, forewing with mostly brown venation, alternate white and brown spots around margin, an indistinct band at gradate series and another toward base, a dark mark on posterior margin near middle, and a great many small brown marks from the veins. Hindwings with mostly pale venation, sometimes darker near tip. Antennæ quite long. Wings broad, especially the costal area near base; four radial sectors, or if three, then the last is forked three times before outer gradate series, the first sector connected back to base of second sector, the cubitus is forked several times between basal cross-veins and inner gradate series. In hindwings the first fork of radial sector is as far out as fork of median vein. Expanse 22 mm.

There are three specimens in the Fitch collection in the National Museum. Have also seen it from Quebec, Canada (Fyles); Franconia, New Hampshire (Slosson); Ithaca, New York, June 23rd, and Isle Royale, Lake Superior (Hubbard)—the type is from Canada. It is our largest species of the genus.

Boriomyia transversa Banks.—Face shining black, vertex and antennæ pale yellowish; thorax pale, a black stripe across front of mesothorax; abdomen brownish; legs pale yellowish. Wings with margins faintly but broadly clouded. Three gradate series clouded with brown, and a brown band between the first and second; first gradate series from base of second radial sector obliquely backward, second and third in usual positions, all nearly complete. There are four sectors in one specimen, but three in the other, but the last one is forked twice before the gradate series. The median vein is not bent toward the cubitus, so that the connecting veinlets are subequal in length; the costal area is very broad at base. In the hindwings the veins are all pale, except a cross-vein closing the post-costal cell, which is prominently brown; the first fork of radial sector is as far out as the fork of median vein. Expanse 20 mm.

One from Colorado (probably Denver), and one from Williams, Arizona, July 24th (Barber).

Boriomyia coloradensis Banks.—Head pale yellowish, a brown spot under each eye, and a larger one below the antennæ, with branches upward around the sockets; antennæ pale yellowish, a brown stripe on outer side of basal joint; thorax pale, brown on sides; legs pale yellowish; abdomen rather dark. Wings hyaline, veins whitish, with brown dots; gradate veinlets brown, slightly clouded, more distinctly on the last two of inner series; each brown dot giving off an oblique mark each side; brown dots around margin of wing; pterostigma indistinct; hindwings not marked, venation pale. Wings rather broad, tip rounded; costal area broad at base; median not bent toward cubitus at connecting veinlet; a veinlet connecting median and first radial sector; three sectors, upper branch of third forked again before the outer gradate series, lower simple; last veinlet of inner gradate series basad of next to last; first radial sector not connected to second; in hindwings the forks of radial sector and median are opposite. Expanse 16–17 mm.

Specimens from Ft. Collins, Colorado (Baker); Ormsby County, Nevada; San Mateo County, California (Baker); and Laggan, Alberta (Wickham).

Boriomyia schwarzi Banks.—Face shining black, vertex pale yellowish, pronotum and rest of thorax pale, a black stripe across the front of mesothorax, indistinct dark spots on mesothorax and metathorax above. Abdomen brownish; legs pale yellow; wings very pale yellowish, the main veins lightly spotted with black, but the margin of wing unmarked. The first gradate series broken, the posterior part and the median part clouded with brown, so that each wing appears to have two brown spots near middle. In hindwings the veins are all pale, unmarked. In forewings the median is not bent toward the cubitus, so that the basal cross-veins there are of subequal length. In hindwings the first fork of the radial sector is as far out as the fork of median vein. In the forewing the first radial sector is not connected to second near base, and there are three or four branches from the cubital cell. Expanse 16–18 mm.

Specimens from Williams, Arizona (Barber), July 23rd, and Mesilla, New Mexico (Morse).

Boriomyia disjuncta Banks.—Head black, with two pale spots above, antennæ pale; thorax pale, blackish on the sides, and some dark, almost connected, spots along the middle; abdomen blackish; legs pale, darker toward the tips of the femora, and the bases and tips of anterior tibiæ. Wings with blackish veins, dotted and spotted with white; three dark spots on the posterior margin, all tending to form bands, the last one about middle of wing and more prominent than others; some clouds near the pterostigma and on the outer gradate series; the margin with alternating dark and white patches; pterostigma obscure; cross-veins all dark; hindwings not marked, venation blackish. Wings rather slender, almost pointed at tip; median not bent toward cubitus at connecting vienlet; a veinlet connecting median and first radial sector some distance out on latter; first radial sector not connected to second; three radial sectors, the third forked twice before outer series of gradate veinlets; last gradate veinlet of inner series coinciding with next to last. Expanse 20 mm.

Specimens from Mt. Washington, New Hampshire (Slosson); Sherbrooke, Canada (Bégin); Ithaca, Axton (MacGillivray), and Keene Valley, New York; Kaslo and vicinity, British Columbia (Currie). June to August.

Boriomyia posticata n. sp.—Face brownish, vertex yellowish; antennæ yellowish; thorax with a broad median yellow stripe, and a broad red-brown one each side; abdomen dark brown; legs pale yellowish. Wings hyaline; venation pale, marked with brown; middle area of wing barely marked at all; the costal area somewhat marked, and the cross-veins bordered with brown; the wing beyond the outer gradate series is more distinctly marked with small patches of brown. Where the inner gradate series meets the lower branch of median there is a large triangular brown spot, its tip extending out on the median vein; behind the cubitus the wing is very distinctly and obliquely barred with brown, two of the bands being quite broad; pterostigma not distinct. Hindwings hyaline, with apical venation brown. Three radial sectors, third forked but once before outer gradate series; costal area moderately broad at base; the median is not bent toward the cubitus at connecting veinlet. The wing is longer than usual. In hindwings the first fork of radial sector is out as far as fork of median. Expanse 21 mm.

One female from southern Utah.

SYMPHEROBIUS n. gen.

Antennæ moniliform; wings entire; subcosta ending in margin; costal area rather broad at base, a recurrent vein; costal cross-veins often branched; two series of gradate veinlets in forewings, the outer of only four veinlets; only one series (the inner) in hindwings; a cross-vein connecting first radial sector to median vein; the median is usually a little bent toward the cubitus at connecting veinlet; in hindwings the median usually forks plainly beyond forking of radial sector; usually but two radial sectors.

Type.—*S. amiculus* Fitch.

This genus includes a few European species, among them *Hem. elegans* Steph.

SYNOPSIS OF SPECIES.

1. Venation of forewings entirely dark .... 2.
Venation of forewings interrupted with pale .... 3.
2. One or two dark lines between veins .... **occidentalis.**
Membrane of wing entirely dark .... **umbratus.**
3. Longitudinal veins of forewings minutely dotted with brown .... 4.
Longitudinal veins of forewings mostly dark, but interrupted by whitish spaces .... **angustus.**
4. Forewings with broad bands on gradate series, and a band nearer base. **pictus.**
Forewings do not have both gradate series broadly marked .... 5.
5. Costal area narrow at base; no large dark spot on posterior part of inner gradate series reaching to margin of wing; black basal part of antennæ not sharply terminating .... **perparvus.**
Costal area broader at base; a large dark spot on posterior part of inner gradate series reaching nearly to margin of wing; black basal part of antennæ usually sharply defined .... 6.
6. Eastern specimens .... **amiculus.**
Western specimens .... **barberi.**

Sympherobius occidentalis Fitch.—Face shining brown, vertex pale, basal joints of antennæ yellow, beyond for one-third black, rest pale yellow; thorax brown, with indication of pale median stripe; abdomen brown; legs pale yellow, femora sometimes infuscated; wings with one or two brown lines in each cell, except the costal area, venation brown, the cubitus and basal cross-veins more heavily marked; apical margin with dark dots. Hindwings rather dusky, venation brown, costal area rather darker than elsewhere. Forewings with the costal area rather broad, two radial sectors, first usually connected back to radius, but not to second, the median is but little bent toward cubitus at connecting veinlet, which is at about same point as veinlet connecting cubitus to anal; cubital cell long, with two branches below, four outer gradate veinlets, often disjoined. Expanse 10 mm.

Described by Fitch from northern Illinois. I have seen it only from Onaga, Kansas (Crevecoeur). A very distinct species by the dark lines in membrane between veins.

Sympherobius umbratus Banks.—Dark shining brown; abdomen rather paler brown antennæ and legs pale yellow; forewings uniformly dark brown; hind wings nearly hyaline, except the brown costal streak, all venation brown, unmarked. In structure similar to *S. occidentalis;* the first radial sector connected to lower fork of the second sector, the first sector not forked till near margin of wing; the costal area is quite broad. ·Expanse 10 mm.

From Williams, Arizona, June 10th (Barber), and Albuquerque, New Mexico (Oslar).

Sympherobius angustus Banks.—Head pale yellowish, a dark line on cheeks and one near eye in front, a black spot between bases of antennæ, an oblique black line on each side of vertex; antennæ scarcely blackish on basal third; pronotum pale, brownish each side, meso—and metathorax brown, with median pale stripe; abdomen pale brown; legs pale yellowish. Fore wings pale, densely marked with brown, especially behind, apical margin with large dark spots alternating with white ones; gradate veinlets heavily brown, longitudinal veins pale, with long stretches of brown, sometimes clouding the wing, basal cross-veins broadly brown, no large posterior mark. In hind wings the marginal venation is brown, and the membrane faintly clouded along posterior margin Fore wings long and narrow, costal area narrow at base, two radial sectors, the first connected back to radius before origin of the second. In the hind wings the radial sector at base is connected back to radius to form a small closed cell near base of wing. Expanse 12 mm.

One specimen from Mesilla, New Mexico (Morse), two from Los Angeles, California, and others from Las Vegas Hot Springs New Mexico, August (Barber); also from San Luis, Mexico, preying on *Ceroplastes.*

Sympherobius pictus Banks.—Pale brown; prothorax rather darker; antennæ pale, black-ringed at base and blackish at tip; legs pale yellow. Fore wings hyaline, with four broad brown bands in middle area of wing, the two intermediate rather close together. Around the outer and posterior margin are pale brown spots alternating with smaller whitish spots; costal area pale brown, veins pale, dotted with brown; hind wings hyaline, costal area and venation pale brown. The wings are rather short, the costal area moderately broad at base; the first radial sector forks before origin of second sector, but does not appear to be connected to it or to radius. Expanse 9 mm.

From southwestern Colorado (Oslar).

Sympherobius perparvus McLachlan.—Face pale yellow, vertex pale, pronotum brown, meso-and metathorax paler brown; abdomen brown; legs pale yellowish, hind femora brownish; antennæ brownish, barely paler beyond. Wings hyaline, marked with brown, sometimes very heavily and indicating three irregular bands, two on gradate series and one nearer to base; apical and posterior margins white and brown alternating, longitudinal veins pale, evenly marked with minute brown dots; hind wings with mostly pale venation, costal area brownish, especially at pterostigma, and often indications of brown patches along apical margin. Fore wings long and narrow, costal area narrow at base, about three times as wide as length of veinlet connecting sub-costa to radius; two radial sectors, not commonly connected, the median is not bent toward cubitus at connecting veinlet, two branches from lower border of cubital cell, four veinlets in outer gradate series, usually disjoined. Expanse 9 to 11 mm.

Various specimens from Texas, New Mexico and Arizona in May and July. Sometimes very pale; one specimen from Arizona is extremely dark, the membrane being almost entirely brown.

Sympherobius amiculus Fitch.—Face shining brown, vertex brown. Thorax and abdomen brown, legs pale yellowish; antennæ black on basal two-fifths, very pale beyond, the limit of dark usually very distinct. Wings hyaline, mottled with small brown patches, rather evenly distributed. Along the inner gradate series are dark brown marks which culminate in a subtriangular mark, reaching to the posterior margin; longitudinal veins pale, evenly marked with minute brown dots, apical and posterior margin alternately white and brown; hind wings with pale venation. Fore wings rather broad, costal area at base broad, about five times the length of veinlet connecting subcosta and radius; four outer gradate veinlets, usually in twos; two radial sectors, the first usually connected to second near base of latter; the median vein is but little bent toward cubitus at connecting veinlet, and this veinlet is much farther out than that connecting cubitus and anal; the lower border of cubital cell emits two branches. Expanse 9 to 12 mm.

Described from central New York and Illinois. I have specimens from Sea Cliff, New York; Washington, D. C., and Falls Church, Virginia, in July. I have seen the type in the Museum of Comparative Zoology at Cambridge, Massachusetts.

Sympherobius barberi Banks.—Head pale yellowish, antennæ pale marked with black near base and tip as in allied species. Thorax pale, darker on sides; abdomen brownish; legs pale yellow. Wings pale, the fore wings finely and evenly irrorate with light brown, except the base is paler, and there is a larger patch near middle of hind margin, and one in anal area. The venation is pale, with brown dots, and there are scattered white spots along the outer margin. The hind wings are hyaline, with pale venation, except that around the margins is more brownish. The fore wings are rather long and narrow, and the costal area is broad at base, but four outer gradate veinlets, two radial sectors, the first connected to median near base. No outer cross-veinlets in hind wings. Expanse 9 mm.

Two specimens from Williams, Arizona, July 20th (Barber); also East Las Vegas, New Mexico (Cockerell).

MEGALOMUS Rambr.

Wings entire; broad; the subcosta ends in margin; the costal area very broad at base, with a recurrent vein; costal veinlets branched; two series of gradate veinlets; at least five radial sectors; all the veins very close together.

Type.—*M. tortricoides* = *hirtus* Fabr.

This genus is very closely allied to *Hemerobius;* no species occur in the Eastern States.

SYNOPSIS OF SPECIES.

1. Upper half, at least, of outer gradate series brown; inner gradate series brown nearly to radius..........2
   Outer gradate series almost wholly pale; inner gradate series with several pale veinlets on upper part, large species.......... **latus.**
2. Venation denser; median forked between gradate series.......... **mœstus.**
   Venation more open; median not forked between gradate series.... **minor.**

Megalomus latus Banks.—Head pale brown; antennæ rather paler; thorax darker brown; abdomen brown; legs yellowish. Wings hyaline, veins densely dotted with brown; dark spots alternate with pale around the margin, first gradate series marked with black except near base, second series mostly pale, a rather large blackish spot on middle of hind margin; hind wings hyaline, costal area and apical venation brown, also two brown spots on the hind margin. Fore wings very broad, especially the costal area at base, five or six radial sectors, the first soon forked, veins very close together; first gradate series straight, oblique; second curved, following the outline of wing. In hind wings four branches to radial sector, the costal cross-veins very numerous. Expanse 20 mm.

Specimens from Las Vegas Hot Springs, New Mexico; Williams, Arizona, July; and Huachuca Mountains, Arizona.

Megalomus mœstus Banks.—Head pale shining brown, mouthparts yellowish; antennæ pale; thorax brown; legs pale yellowish. Wings hyaline, venation pale yellowish, dotted and spotted with brown, gradate veinlets entirely brown, except some in lower half of outer series, costal and apical margin of wings alternately brown and pale; a large dark spot on hind margin near end of anal vein. Fore wings very broad, costal area very broad at base; five or six radial sectors; the first soon forked; all veins very close together; first gradate series bent basad at middle, second curved, following outline of wing. Expanse 15 mm.

Specimens from Santa Fé, New Mexico, July and August (Cockerell).

Megalomus minor n sp.—Head pale yellowish, vertex with a dark median stripe; antennæ pale, rather darker beyond; palpi, pale yellowish; thorax and abdomen dark brown; legs pale yellowish. Wings hyaline; venation pale, marked with brown, the longitudinal veins and costal veinlets interruptedly brown and yellowish, the gradate series nearly black, and a black spot at the anal angle, and a smaller one on cubitus toward base; margin with alternate brown and white patches. Wings of usual shape; venation not as dense as in allied species, five or six sectors, the first gradate series but little curved. Length 6 mm.

Two specimens from San Marcos, Nicaragua, and one from Ormsby County, Nevada (Baker). Differs from *M. mœstus* and *M. latus* in smaller size, dark stripe on vertex and less dense venation.

PSECTRA Hagen.

Antennæ moniliform ; wings with costal area narrow at base; no true recurrent nervure ; two radial sectors ; and only one series of gradate veins; margin entire ; in the only known species the female lacks the hindwings.

Type.—*P. diptera* Burm., the only species.

Psectra diptera Burm.—Face shining black, vertex brown, antennæ brownish, thorax paler brown; abdomen dark brown; legs yellowish, brownish on knees. Wings nearly hyaline; slightly marked with brown between the veins; venation mostly brown; some of the longitudinal veins marked with pale, a more or less distinct brown band on gradate series; pterostigma not distinct; hind wings nearly hyaline, costal margin darker on basal half; venation pale, brown near tip. Basal joint of antennæ rather large, vertex hairy, tibiæ of legs swollen in middle; forewings rather slender, rounded at tip, subequal in width throughout; costal area narrow at base; two radial sectors, the first soon forked; one gradate series, interrupted in the middle; hind-wings slender, three radial sectors; no gradate series; female without hind wings. Expanse 5 to 6 mm.

Specimens from Ithaca, New York ; Agricultural College Michigan (Pettit); and Franconia, New Hampshire (Slosson). Fitch's specimens were from northern Illinois, in October. It appears to be more common in this country than in Europe.

MICROMUS Rambr.

Antennæ moniliform ; wings entire; subcosta ends in the margin ; costal area narrow at base, no recurrent vein; three to five radial sectors; two series of gradate veinlets.

Type.—*M. variegatus* Fabr.

A very easily recognized genus; there are two groups of our forms, those with broad wings and those with slender wings.

SYNOPSIS OF SPECIES.

1. The gradate veinlet of inner series that connects first radial sector to the median is basad of the one above it, this series making an even gradate row; wings rather short; five radial sectors.......... **angulatus.**

This gradate veinlet is beyond the one above it, so that this series is broken and not even..2.

2. Five radial sectors, the outer gradate series forming an even row **montanus.**

Four radial sectors or less...3.

3. Gradate veinlets of inner series usually less, never much more, than length apart..**posticus.**
   Gradate veinlets of inner series much more than length apart..............4.
4. Membrane of wing considerably infuscated in spots, veins mostly brown **variolosus.**
   Membrane without dark spots, veins mostly pale...........**subanticus.**

Micromus angulatus Steph.—Head pale brown; thorax similar, with darker patches on the lateral lobes; abdomen brown; legs pale yellow, anterior tibiæ with brown marks on outer side. Wings hyaline; indistinctly marked with wavy brown bands; venation pale, dotted and spotted with brown; cross-veins wholly brown, margin with alternate stretches of pale and brown; hind wings hyaline, venation pale, except brown at apex. Wings rather broad; short for length of abdomen; four radial sectors; the two gradate series even and parallel, the next to last of inner series before previous one. Expanse 15 to 16 mm.

Specimens from Fort Collins, Colorado; Franconia and Mt. Washington, New Hampshire (Slosson). Hagen recorded it from the White Mountains and Canada. It is a mountain loving species in Europe.

Micromus montanus Hagen.—Head dull yellowish; antennæ pale yellow; thorax yellowish, brown on sides; abdomen brown; legs pale yellow. Wings hyaline; venation yellowish, marked with pale brown; cross-veins pale brown; costal venation almost wholly pale; membrane with transverse brown bands, those on gradate series most distinct; hind wings hyaline, venation wholly pale yellow. Wings moderately broad; five radial sectors; next to last veinlet of inner gradate series beyond the previous, rest of series even. Expanse 20 to 22 mm.

Specimens from Mt. Washington, New Hampshire (Slosson); Beulah, New Mexico (Cockerell); Ormsby Co., Nevada (Baker); and Kaslo, British Columbia (Currie). Hagen had it from Natick, Massachusetts, and the White Mountains, July. It is extremely close to the European *M. paganus* Linn.

Micromus posticus Walk.—Head pale, marked with reddish on face and vertex; antennæ pale, darker toward tip; thorax brown, with some indistinct pale spots; abdomen brown; legs pale yellowish, tibiæ with dark mark on outer side near tip. Wings hyaline; alternate brown and white patches around margin; venation pale, marked with brown in dots and spaces; cross-veins wholly brown; membrane of wing crossed by many wavy brown bands, most distinct in outer posterior part; hind wings unmarked, venation reddish, except pale on base, and cross-veins dark brown. Wings rather slender; four radial sectors; next to last veinlet of inner gradate series is beyond the previous one, otherwise the series is regular. Expanse 15 to 18 mm.

Many specimens from various localities in the Eastern and Southern States throughout the summer; one of our most abundant Hemerobiids. I have bred the larvæ several times; they occur on various deciduous trees, feeding on plant-lice.

Micromus variolosus Hagen.—Head pale yellow, a dark line on middle, connected to a line on base of clypeus, antennal sockets margined with dark, and vertex dark in middle; antennæ yellowish; thorax and abdomen brown; legs pale yellow; tibiæ marked with brown on outer sides. Wings hyaline, with brown clouds and streaks or bands, most prominent on outer half; venation brown, with pale spots; margin alternately brown and white; hind wings hyaline, with brown venation. Wings very slender; four radial sectors; the gradate series very irregular, and each veinlet more than its length from any other. Expanse 13 to 15 mm.

Specimens from Denver, Fort Collins and Salida, Colorado; Pullman, Washington; Pecos and Mesilla, New Mexico; and various places in Arizona. Hagen had one specimen from Denver, Colorado. They have mostly been taken in June and July.

Micromus subanticus Walker.—Head yellowish; thorax similar; antennæ pale; legs pale; abdomen brown. Wings hyaline, venation almost hyaline, with a few brown dots, cross-veins more brown, two of the outer gradate ones and the basal cross-vein more heavily brown, and margined with brown, a few brown spots along posterior margin; hind wings pale, venation pale in basal half, brown beyond. Wings slender; the gradate series very irregular, and each veinlet more than its length from any other; four radial sectors. Expanse 13 to 15 mm.

Specimens from Shreveport, Louisiana; Biscayne Bay, Florida; and Falls Church, Virginia, in June, on ground near base of grass tufts. Hagen had it from Haulover, Florida, March; Morgantown, North Carolina.

Since the above paper was written (November, 1904) there has just come to hand (July, 1905) Bull. No. 86 of the New York State Museum, with a table of genera of Hemerobiidæ, by J. G. Needham. He separates *Hemerobius amiculus* in a new genus—*Palmobius*, on the same venational point as myself. However, he has not noted the absence of apical cross-veins in hindwings, nor their number in forewings. He also separates from this a new genus, *Spadobius*, for what he calls the *H. occidentalis* Fitch. His figures of the wing, however, shows it is not that species at all, and in fact is closely allied to *S. amiculus*, and quite probably a specimen of that species. My series of this species shows still greater venational differences, which are evidently of no value. It is of course possible that there is in the east another species similar to *S. amiculus*, but it can only be proven by an examination of the male genitalia. The new genera used in this paper have been published in connection with a described species in my list of Neuropteroid insects from Washington, D. C., in November, 1904; so that Mr. Needham's two genera, *Spadobius* and *Palmobius*, are synonyms of my *Sympherobius*,

Mr. Needham in the same article describes a new *Micromus*, *M. jonas*, only known from the wings found in the stomach of a bullfrog. The venation is like that of *M. montanus*, except that there are but four sectors; this point, however, is not always constant in the genus, although usually so.

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CATALOGUE.

DILAR.

Rambur, Hist. nat. Nevropt., 445, 1842.

D. **americana** McLachlan, Ent. Mo. Mag., xviii, 53, 1881.

SISYRA.

Burmeister, Handb., ii (3), 975, 1839.

S. **vicaria** Walk., B. M. Cat., Neur. (2), 297, 1853.
umbrata Needham, Bull. No. 47, N. Y. State Museum, 555, 1901.

CLIMACIA.

McLachlan, Ent. Mo. Mag., vi, 21, 1869.

C. **areolaris** Hagen, Syn. Neurop, N. A , 199, 1861.
dictyona Needham, Bull. No. 47, N. Y. State Museum, 558, 1901.

LOMAMYIA.

Banks, supra.

L. **texana** Banks, Trans. Amer. Ent. Soc., xxiv, 24, 1897.
occidentalis Banks, Proc. Ent. Soc. Wash., v, 240, 1903 (undescribed).

L. **flavicornis** Walker, B. M. Cat., Neur. (2), 278, 1853.
hamatus Walker, ibid,
pennsylvanicum Brauer, Verh., zool.-bot. Ges. Wien, 1869, 897.

POLYSTOECHOTES.

Burmeister, Handb., ii (3), 982, 1839.

P. **punctatus** Fabricius, Ent. Syst., ii, 73, 1793.
nebulosus Fabr., Ent. Syst., Supp., 202, 1798.
irroratus Say, Long's Exped., ii, 306, 1824.
sticticus Burm., Handb., ii (3), 982, 1839.
validus Walk., B. M. Cat., Neur. (2), 233, 1853.
P. **vittatus** Say, Long's Exped., ii, 307, 1824.

HEMEROBIUS.

Linneaus, Syst. Nat. (x), 549, 1758.
Mucropalpus Rambr. Nevropt., 420, 1842.

H. **stigmaterus** Fitch, First Rept. Ins. N. Y., 93, 1855.
H. **kokaneeanus** Currie, Proc. Ent. Soc. Wash., vi, 86, 1904.
H. **mœstus** Banks. Trans. Amer. Ent. Soc., xxiv, 25, 1897.
bistrigatus Currie, Proc. Ent. Soc. Wash., vi, 79, 1904.
dyari Currie, ibid, 85.
H. **simplex** Banks, supra.
H. **humuli** Linn. Syst. Nat., x, 550, 1758.
castaneæ Fitch, First Rept. Ins. N. Y., 94, 1855.
tutatrix Fitch, ibid.
H. **marginatus** Steph., Ill. Brit. Ent., Mand., vi, 109, 1836.
H. **pacificus** Banks, Trans. Amer. Ent. Soc., xxiv, 24, 1897.
pallescens Currie, Proc. Ent. Soc. Wash., vi, 80, 1904.
H. **simulans** Walker, B. M. Cat., Neur. (2), 285, 1853.
crispus Walk., ibid (nec. Stephens).
orotypus Walleng., Œfv. Svenska Acad., 1870, 155.
H. **hyalinatus** Fitch, First Rept. Ins. N. Y., 95, 1855.
canadensis Banks, Trans. Amer. Ent. Soc., xxiv, 26, 1897.
kootenayensis Currie, Proc. Ent. Soc. Wash., vi, 88, 1904.
H. **dorsatus** Banks, Can. Entom., 1904, 61.
H. **cockerelli** Banks, Psyche, ix, 286, 1901.
caudelli Currie, Proc. Ent. Soc. Wash., vi, 87, 1904.
H. **conjunctus** Fitch, First Rept. Ins. N. Y., 94, 1855.
pididumus Fitch, ibid, 95.
venustus Banks, Trans. Amer. Ent. Soc., xxiv, 25, 1897.
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H. **nevadensis** Banks, Can. Entom., 1904, 61.

BORIOMYIA.

Banks, supra.

B. **fidelis** Banks, Trans. Amer. Ent. Soc., xxiv, 27, 1897.
B. **speciosus** Banks, Can. Entom., 1904, 62.
B. **longifrons** Walker. B. M. Cat., Neur. (2), 291, 1853.
alternatus Fitch, First Rept. Ins. N. Y., 93, 1855.
B. **transversus** Banks, Can. Entom., 1904, 61.

B. **coloradensis** Banks, Trans. Amer. Ent. Soc., xxiv, 26, 1897.
B. **schwarzi** Banks, Proc. Ent. Soc. Wash., v, 241, 1903.
B. **disjunctus** Banks, Trans. Amer. Ent. Soc., xxiv, 25, 1897.
B. **posticatus** Banks, supra.

SYMPHEROBIUS.

Banks, supra.

S. **occidentalis** Fitch, First Rept. Ins. N. Y., 95, 1855.
S. **umbratus** Banks, Proc. Ent. Soc. Wash., v, 242, 1903.
S. **angustus** Banks, Trans. Amer. Ent. Soc., xxx, 102, 1904.
S. **pictus** Banks, Can. Entom., 1904, 62.
S. **perparvus** McLachlan, Ent. Mo. Mag., vi, 22, 1869.
S. **amiculus** Fitch, First Rept. Ins. N. Y., 95, 1855.
S. **barberi** Banks, Proc. Ent. Soc. Wash., v, 241, 1903.

MEGALOMUS.

Rambur, Hist. nat. Nevropt., 418, 1842.

M. **latus** Banks, Proc. Ent. Soc. Wash., v, 240, 1903.
M. **mœstus** Banks, Trans. Amer. Ent. Soc., xxii, 314. 1895.
M. **minor** Banks, supra.

PSECTRA.

Hagen, Stett. Ent. Zeit., 1866, 376.

P. **diptera** Burm., Handb., ii (3), 973, 1839.
delicatulus Fitch, First Rept. Ins. N. Y., 96, 1855.

MICROMUS.

Rambur, Hist. nat. Nevropt., 416, 1842.

M. **angulatus** Steph., Cat. Brit. Ins., 312, 1829. Hagen, Proc. Bost. Soc. N. H., xxiii, 280, 1886.
M. **montanus** Hagen, Proc. Bost. Soc. N. H., xxiii, 279, 1886.
M. **posticus** Walker, B. M. Cat., Neur. (2), 283, 1853.
insipidus Hagen, Syn. Neur. N. Am., 199, 1861.
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M. **subanticus** Walker, B. M. Cat., Neur. (2). 282, 1853.
angustus Hagen, Proc. Bost. Soc. N. H., xxiii, 287, 1886.

UNPLACED.

Hemerobius longicollis Walk., B. M. Cat., Neur. (2), 281, 1853.

The long pronotum is unusual in this family—it is from Georgia.

Hemerobius citrinus Hag., Syn. Neur. N. Am., 204, 1861.

Too briefly described from a poor specimen in the Berlin Museum.

Hemerobius obliteratus Walk., B. M. Cat., Neur. (2), 288, 1853.

Might be either *H. humuli* or *H. stigmaterus*.

EXPLANATION OF PLATES.

PLATE III.

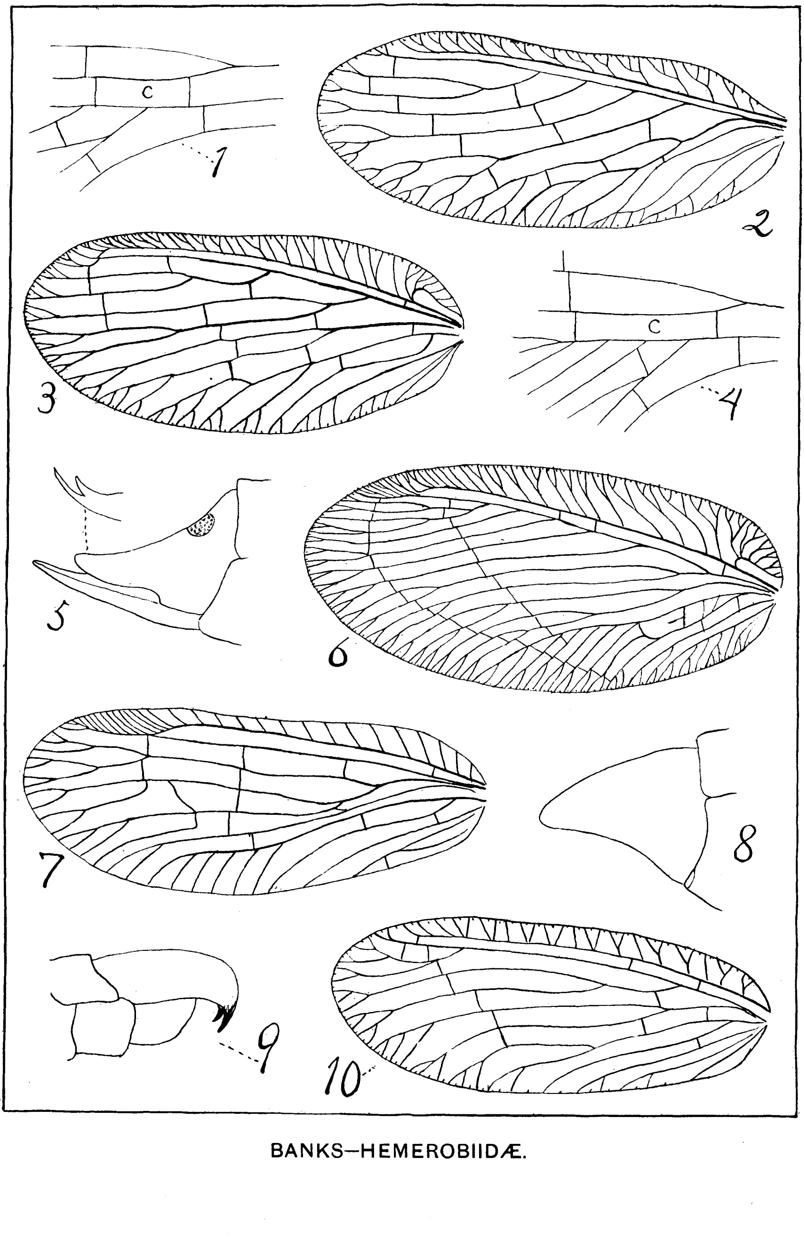
Fig. 1. Portion of wing of *Boriomyia fidelis*, *c*, cubital cell.
" 2. Forewing of *Micromus*.
" 3. Forewing of *Sympherobius*.
" 4. Portion of wing of *Boriomyia disjunctus*, *c*, cubital cell.
" 5. Genitalia of *Hemerobius simplex*.
" 6. Forewing of *Megalomus*.
" 7. Forewing of *Climacia*.
" 8. Genitalia of *Boriomyia longifrons*.
" 9. Genitalia of *Boriomyia schwarzi*.
" 10. Forewing of *Psectra*.

PLATE IV.

" 11. Genitalia of *Lomamyia texana*.
" 12. Forewing of *Sisyra*.
" 13. Forewing of *Lomamyia*.
" 14. Genitalia of *Hemerobius conjunctus*.
" 15. Genitalia of *Sympherobius amiculus*.
" 16. Portion of wing of *Boriomyia transversa*, *c*—cubital cell; v—basal vein.
" 17. Genitalia of *Boriomyia coloradensis*.
" 18. Portion of wing of *Hemerobius conjunctus*.
" 19. Portion of wing of *Hemerobius humuli*.

PLATE V.

" 20. Genitalia of *Hemerobius conjunctus*, top view.
" 21. Genitalia of *Hemerobius dorsatus*.
" 22. Genitalia of *Hemerobius cockerelli*.
" 23. Genitalia of *Boriomyia coloradensis*, top view.
" 24. Genitalia of *Sympherobius perparvus*.
" 25. Genitalia of *Sympherobius angustus*.
" 26. Genitalia of *Hemerobius humuli*.
" 27. Genitalia of *Hemerobius mœstus*.
" 28. Genitalia of *Hemerobius stigmaterus*.
" 29. Genitalia of *Boriomyia transversa*.
" 30. Genitalia of *Hemerobius dorsatus*, top view.
" 31. Genitalia of *Boriomyia fidelis*.
" 32. Genitalia of *Sympherobius umbratus*.
" 33. Genitalia of *Boriomyia longifrons*, top view.
" 34. Genitalia of *Boriomyia disjuncta*.
" 35. Genitalia of *Hemerobius pacificus*.
" 36. Genitalia of *Boriomyia disjuncta*, end view.
" 37. Genitalia of *Hemerobius humuli*, top view.
" 38. Genitalia of *Hemerobius humuli*, top view.
" 39. Genitalia of *Hemerobius pacificus*, top view.



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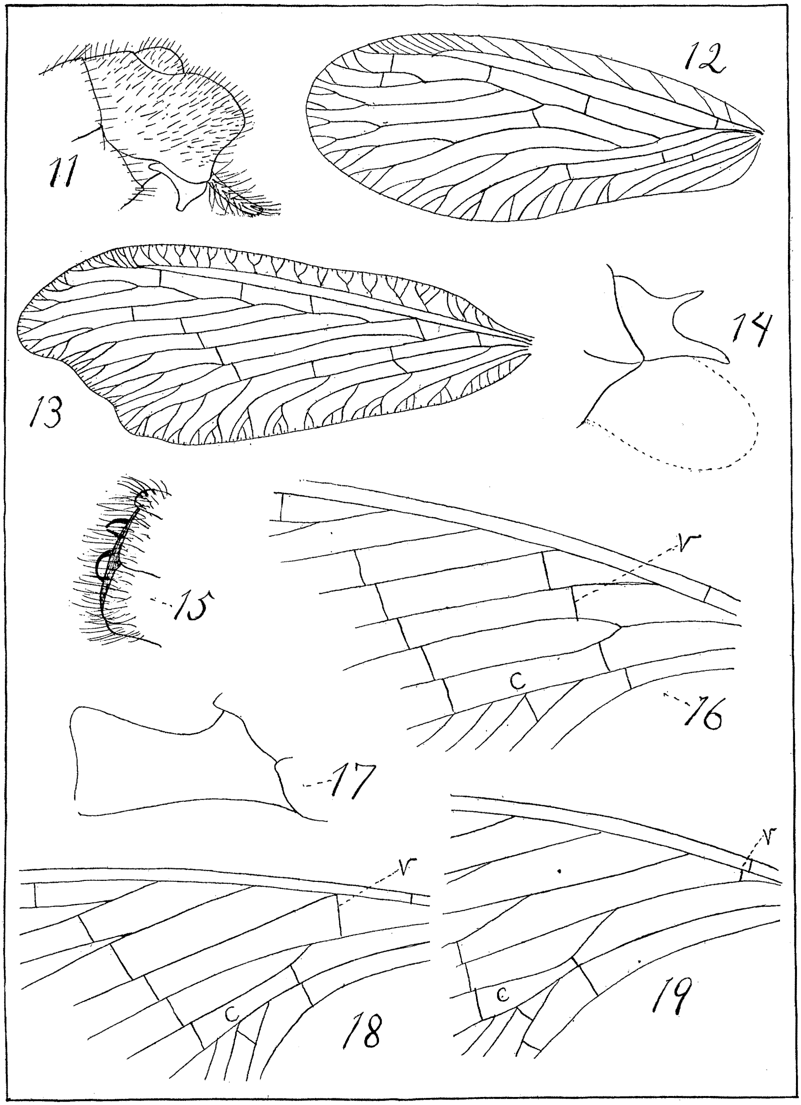

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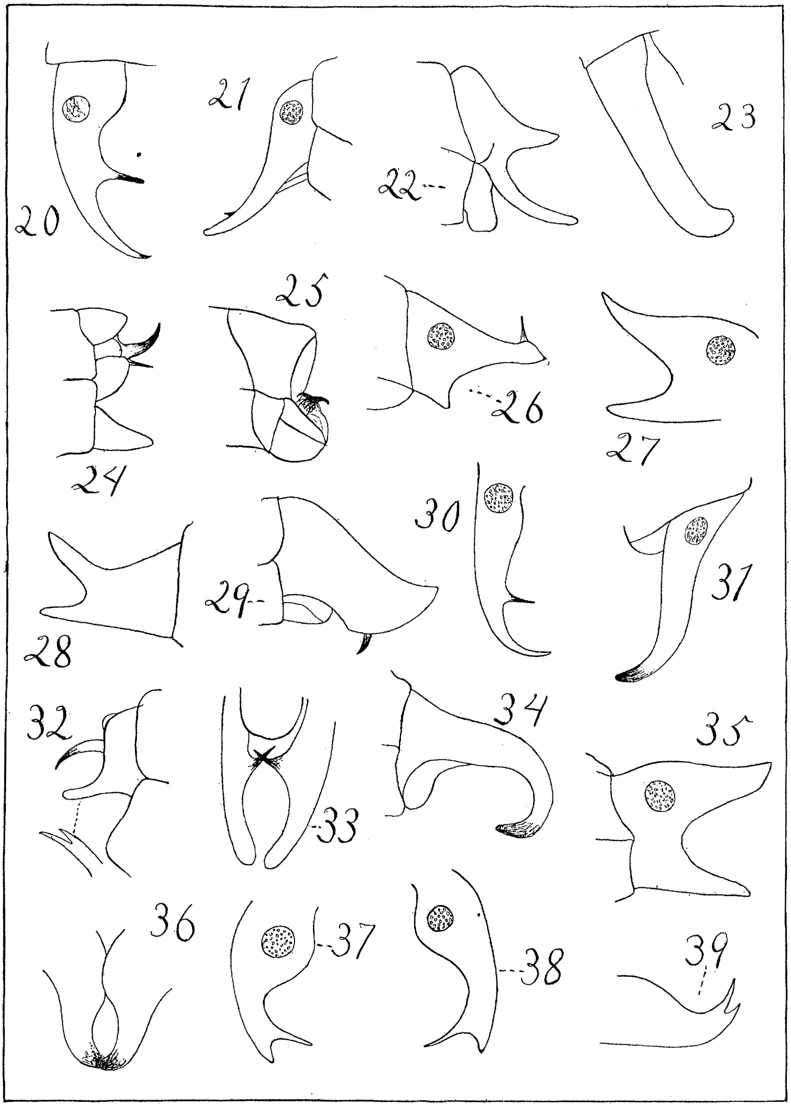

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